REMARKS

I. Introduction

In response to the pending rejection and the interview conducted on February 10, 2006, Applicants amend claims 1, 8 and 15 so as to clarify the intended subject matter of the present invention. The foregoing claim amendments are not intended to narrow the scope of the invention, but to only clarify the invention. In addition, new claim 22 has been added. No new matter has been added.

With regard to the interview, as correctly summarized in the interview summary dated February 15, 2006, Applicants explained to the Examiner how the cited prior art, at a minimum, fails to disclose or suggest generating an interference map. Applicants have amended claims 1, 8 and 15 to make clear that the generating of an interference map is an active step in the claimed process (see, claim 1). For the reasons set forth below, it is again submitted that the cited prior art fails to disclose or suggest the claimed invention.

II. The Rejection Of Claims 1-4, 8-11 And 15-18 Under 35 U.S.C. § 103

Claims 1-4, 8-11 and 15-18 were rejected under 35 U.S.C. § 103 as being obvious over USP No. 6,777,142 to Pierrat in view of USP Pub. No. 2004/0122636 to Adam. Applicants respectfully submit that the pending claims are clearly not obvious in view of Pierrat and Adams taken alone or in combination with one another, for at least the following reasons.

The present invention relates to a novel method for placing optical proximity correction (OPC) features within a mask design that allows for deep sub-wavelength mask patterns to be imaged using substantially any illumination condition through pitch. As recited by each of the pending independent claims, the method of the present invention entails **generating an**

"**interference map**" based on the target pattern which defines areas of constructive interference and destructive interference between the features to be imaged and the field areas surrounding and adjacent to the features to be imaged. *Once the areas of constructive and destructive interference are identified, assist features are placed in the target pattern based on the locations of the areas of constructive and destructive interference.* Referring to Applicants' specification, the interference map illustrates whether each point in the field surrounding the desired target point interacts constructively (i.e., making the intensity of the transmitted light on the target pattern greater), destructively (i.e., making the intensity of the transmitted light on the target pattern lower) or is neutral (i.e., not altering the intensity of the light on the target pattern). As noted, the interference map can be generated using known simulation tools.

Turning to Pierrat, this reference is directed to a method for resolving phase conflicts which occur when utilizing phase-shifting features to implement target features to be imaged on the wafer. As explained for example in col. 3, lines 4-22, the method of Pierrat includes adjusting for phase conflicts in a first mask, which can be caused by the end portions of the features formed utilizing phase-shifting areas, by dividing the phase-shift area into two areas having a first and second phase-shift and disposing an opaque feature between the two phase-shift areas. The process further includes the generation of a complementary mask which has an opaque portion for preventing exposure of the features to be printed by the first and second phase shift areas of the first mask, and a cut-out area over the opaque feature separating the first and second phase shift regions so as to expose any feature resulting from the phase difference between the first and second phase regions.

Importantly, however, Pierrat does not disclose generating an interference map as recited by the claimed invention. First, as noted above, the interference map of the present

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invention illustrates whether each point in the field surrounding the desired target point interacts constructively, destructively or is neutral relative to the feature to be imaged. Pierrat does not disclose or suggest the generation of such a map. Pierrat simply identifies locations where possible phase-conflicts exist by identifying the portions of the phase-shift mask where phase-changes occur. *However, there is no information generated in the process of Pierrat indicating whether a given point interferes constructively, destructively or is neutral relative to the imaging of the feature.* Indeed, it does not appear that Pierrat confirms whether or not such phase-conflicts degrade the imaging performance, it is just assumed that they do, which is an incorrect assumption. As such, Pierrat does not disclose generating information concerning whether the points around a given feature interfere constructively, destructively or are neutral with respect to the imaging of the feature. Thus, Pierrat does not disclose generating an interference map as recited by the pending claims.

Furthermore, as it is clear that, at a minimum, Pierrat does not disclose generation of information concerning the areas of constructive interference, Pierrat also fails to disclose placing assist features based on the locations of areas of constructive interference and destructive interference defined by the interference map as is recited by each of the independent claims.

In this regard it is noted that Pierrat discloses simulating an intensity profile of the exposure pattern to be generated and locating regions in the intensity profile that are anomalous and placing sub-resolution features in such regions. However, it is well known that the intensity profile (i.e., distribution) relates to the square of the electric field. As such, the intensity profile does not indicate areas of both position and negative intensities. Thus, the intensity of profile of Pierrat is not capable of identifying areas of constructive and destructive interference. As such,

it is clear that Pierrat does not disclose placing assist features within the mask pattern based on the areas of constructive and destructive interference.

Turning to Adam, this reference is wholly unrelated to the present invention and fails to cure any of the foregoing deficiencies of Pierrat. As discussed throughout the specification, Adam relates to the simulation and modeling of electromagnetic scattering of light in imaging systems.

Thus, as each and every limitation must be disclosed or suggested by the cited prior art reference in order to establish a *prima facie* case of obviousness (*see*, M.P.E.P. § 2143.03), and the combination of Pierrat and Adam fail to do so, it is respectfully submitted that the pending claims are patentable over the cited prior art references.

It is also noted that Pierrat and Adam clearly fail to disclose or suggest the subject matter recited in the rejected dependent claims. For example, claim 2 recites a specific process for generating the interference map, which entails reducing the size of the features in the target pattern such that they are less than the resolution capabilities of the given system and performing the simulation process on the reduced size pattern. This allows the simulation process to focus on the center of the feature when generating the interference map. Nowhere does Pierrat or Adam disclose or suggest such a process. Claim 7 recites that the interference map exhibits a non-zero DC level, which allows the interference map to indicate both positive and negative intensity levels. Once again, Pierrat and Adam are silent regarding any such process. As such, it is also respectfully submitted that the rejected dependent claims are patentable over Pierrat and Adam, taken alone or in combination, for reasons additional to those discussed above in conjunction with the independent claims.

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For all of the foregoing reasons, it is respectfully submitted that the pending claims are patentable over Pierrat and Adam.

III. All Dependent Claims Are Allowable Because The Independent Claim From Which They Depend Is Allowable

Under Federal Circuit guidelines, a dependent claim is nonobvious if the independent claim upon which it depends is allowable because all the limitations of the independent claim are contained in the dependent claims, *Hartness International Inc. v. Simplimatic Engineering Co.*, 819 F.2d at 1100, 1108 (Fed. Cir. 1987). Accordingly, as claims 1, 8 and 15 are patentable for the reasons set forth above, it is respectfully submitted that all pending dependent claims are also in condition for allowance.

IV. Request For Notice Of Allowance

Having fully responded to all matters raised in the Office Action, Applicants submit that all claims are in condition for allowance, an indication for which is respectfully solicited.

If there are any outstanding issues that might be resolved by an interview or an Examiner's amendment, the Examiner is requested to call Applicants' attorney at the telephone number shown below.

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Respectfully submitted,

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